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MONTHLY NOTICES

OF THE

ROYAL ASTRONOMICAL SOCIETY.

VOL. XXXI. *January* 13, 1871. No. 3.

William Lassell, Esq., President, in the Chair.

Lord Lindsay, 47 Brook Street;
Rev. J. C. Jackson, Manor Terrace, Hackney;
S. Cottam, Esq., Higher Broughton, Manchester;
T. Ribton, Esq., 48 Woburn Square;
W. H. Mahony Christie, Esq., Royal Observatory, Greenwich;
Joseph Drew, Esq., Weymouth; and
Ankitam Venkata Nursinga Row, of Vizagapatam,

were balloted for and duly elected Fellows of the Society.

Report of Observations, &c., of the Total Eclipse of the Sun, taken at "Le Maria Luisa" Vineyard, Cadiz, December 21–22, 1870, by Lord Lindsay and his Party.

Lord Lindsay writes:—

My party consisted of Lieut. Alex. B. Brown, R.A., C. Becker, Esq., Henry Davis, Esq., and myself. I also had with me three engineers, Messrs. Scott, Rogers, and Winson, the latter of whom is my laboratory assistant. Mr. Scott's services were kindly supplied to me by Mr. Browning, to whom he is chief engineer.

We arrived at Cadiz on the 4th December, and though I experienced some difficulty in getting the instruments, &c., passed through the Custom House, we got to our station on the evening of the 7th December.

The station chosen was the "Maria Luisa" Vineyard, belonging to Mr. Charles Campbell, and which, in a most kind manner, he lent to me for the occasion. My very best thanks are due to him for all he did for us during our stay in Spain.

The instruments used for observation of the eclipse were,—

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1st. A 12¼-inch silver-on-glass reflector, mounted equatorially and made for an observatory in Scotland, N. lat. 57° 30′.

The complementary angle required by the change of the latitude to 36′ 41″, was obtained by a massive framework of wood made of four square pieces dovetailed and bolted through with ½-inch irons and screwed up. The base plate of the instrument stood on this frame-work, and the final adjustments were got by means of screws in the base arranged for the purpose.

The position was roughly laid down by striking the lines of shadow, when the Sun had equal altitudes, and by bisecting the angle so obtained; however, I was unable to place the telescope correctly in the meridian for several days, owing to the bad weather.

This telescope stood in a house which I took out from England for it. One end was fitted up and used for a dark room for photographic purposes. The house was 20 feet long and 11 feet deep. Of this 6 feet by 11 was devoted to the dark room: the remainder to the telescope. It was covered all over with patent felt, and doors were made to open the entire front of that part in which the telescope stood. The roof also was made to cut and slide back to give a view 5° north of the zenith.

The second large instrument was a 6-inch equatoreal by Troughton and Simms, belonging to my observatory in Lancashire. To this instrument was attached a Star-spectroscope by Browning, kindly lent me for the occasion by Mr. David Gill, F.R.A.S. This instrument was fitted with a single prism of 60°, and of moderate low dispersive power. This telescope I intrusted to Lieut. Brown, whom I wished to examine the spectrum given by the corona.

There was also an altazimuth instrument of Troughton and Simms with vertical and horizontal circles 18″ in diameter. This being a remarkably steady instrument, I used it as a transit-circle, &c.

I also mounted a 3¼-in. glass by Cooke and Sons, of York, on a wooden stand put up to the altitude of the pole.

We had very bad weather up to the time of the eclipse, in fact, the 21st was the only really fine day we had.

The morning of the 22nd was very cloudy till 8 o'clock, when it began to rain heavily, but this only lasted about thirty minutes, and then cleared up, and the Sun shone bright, though there were still heavy clouds passing at intervals over the disk. About 8 o'clock my party was augmented by the arrival of Mr. Reade, H.B.M. Consul-General of Cadiz, Mr. C. Campbell, H.B.M. Consul General of Puerto, Mr. Greaves, Navigating Lieutenant H.M.S. "Lee," Mr. Pitman of Puerto, Messrs. A. and E. Thuillier, and Señors Lassaletta and Gonzales.

Mr. Reade and Mr. Campbell and Señor Brogi undertook to assist Lieut. Brown at the spectroscope, while Mr. Pitman kept the time for me. Mr. Greaves measured the angular distance of the streamers of the corona and also the chief prominences

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from the vertex of the Sun as seen in an inverting telescope. These angles were recorded at the time on a position-circle attached to the telescope. The Messrs. Thuillier and Señors Lassaletta and Gonzales made eye-sketches of the corona. These, when compared with the measurements of Mr. Greaves, show a good deal of correspondence *inter se*, though at first sight they might appear to differ.

The first contact was observed by Lieut. Brown with the 6-inch equatoreal, and also by myself with the 3-inch. This occurred at $22^h\ 50^m\ 3^s{\cdot}5$, G.M.T., or in local time, $22^h\ 24^m\ 59^s{\cdot}7$.

I secured several plates during the partial phase of the eclipse, but I was prevented from taking as many as I wished by the stop of my instantaneous slide giving way from the concussion, owing to the strength of the spring. Everything was ready as totality drew near, and the last minute was one of intense anxiety. The time observed of the commencement was $0^h\ 14^m\ 52^s{\cdot}50$, G.M.T., local time, $23^h\ 49^m\ 48^s{\cdot}7$.

During totality I had assisting me at the 12¼-inch equatoreal Mr. Scott, to watch through the finder that the telescope did not shift from its position while changing the plates. Mr. Rogers took the plates from the dumb-waiter, up the partition of the dark room, and handed each fresh one to me and put back the last exposed plate. Mr. Davis and Mr. Winson were in the dark room; the latter coated the plates and put them into the baths, while Mr. Davis received the exposed plates developed, and placed them in a fixing trough.

I had several times previously gone through the drill of totality, so that we all knew our work and about the number of plates we could run through in the time, and I had found that allowing rather short exposures, I could generally put twelve to fourteen plates through the camera in $2^m\ 10^s$. I did not, however calculate on getting as many as that, for fear of under-exposing them.

The last plate of totality was lost by my not pulling the slide open quick enough, as I missed the knob to catch it by, and when I had got it open totality ended.

This picture was developed, but not a sign was to be seen on it. In fact, as soon as I opened the slide I closed it again in hopes that I might have got a picture just as the Moon began to leave the Sun, but I must have miscalculated my exposure, as certainly if I had done this there must have been an impression on the film. I think, therefore, the exposure must have been over about $0^s{\cdot}5$ before the totality ceased.

The time was taken as the first glimpse of sunshine reappeared, and is in G.M.T., $0^h\ 17^m\ 0^s{\cdot}5$, local time, $11^h\ 1^m\ 19^s{\cdot}7$, which gives a duration for the total phase of $2^m\ 8^s$.

Immediately after totality I replaced the instantaneous slide which had been removed during totality; but I was not fated to get another picture, as while the camera was being altered, a dense rain-cloud came up rapidly and entirely obscured the Sun,

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and although I made several attempts they were quite unsuccessful. In fact, we did not get a glimpse of the Sun again the whole day, as it set behind the same cloud.

I then went round and collected the various reports from the rest of my party. Four gentlemen had been successful in getting sketches of the corona and some of the prominences.

I will now pass to the general observations made before and during totality.

At 11.40, local time, the sky was of a purple tint, earth red-brown; everything green seemed intensified in colour.

At 11.45, a strange colour came over the landscape, dark and yet distinct, persons looked livid, cumulo-stratus below the Sun.

At 11.47, objects attained a yellow tint, which decreased in ntensity, and white with a red blue shade.

At 11.48, the clouds seemed to open out all round the Sun.

At the moment of totality the corona shot out on all sides of the Sun, and presented a most wonderful sight. The clouds in the north-east were purple; south-west, blue; north, grey.

Mr. A. Thuillier reports that, during totality, a flock of geese came towards him as if for protection, and the fowls all huddled up in a corner of the roosting-place, as if they were frightened.

I saw *Venus* plainly to the east of the Sun, and fancied that I saw another star, but cannot be sure.

I had requested all my party to notice particularly if the shadow of the Moon was to be seen advancing through the air, but none of them saw it.

The following is a Report by Lieut. Brown of his observations taken at Maria Luisa Observatory, between the 9th and 23rd of December, 1870, including the total eclipse of the Sun on the 22nd.

The general weather notes, also thermometric and barometric observations taken daily, I hand in as a separate form to accompany this paper.

The instruments placed at my disposal were, 1st, a 6-inch equatoreal of 7-feet focus, moved by clock-work, made by Troughton and Simms. 2nd. A star-spectroscope, fitted with a single equilateral prism of very dense glass, very well adapted for spectroscopic analysis of the corona (or of the prominences during totality) made by Browning, of London. This instrument needed only to make it complete for its purpose, to have an automatic recording arrangement affixed thereto. I hardly realised the necessity for this till within a few days of the eclipse, so at once set to work to construct a recorder, and fitted it to the spectroscope, which, as will be hereafter seen, worked very well. Indeed, I know of no other mode of measuring the position of lines quickly that I would adopt during an eclipse. Any attempt to read off the position of the cross-wires in a graduated arc *several times* would be quite out of question, and any species of comparison references I should

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equally reject as being confusing and untrustworthy, besides being very liable to derangement.

Every available observing day and night between the 10th and 22nd, the 6-inch equatoreal was called into use for various duties, transits, occultations, mapping of Sun-spots, spectroscopic observations (with the assistance of the spectroscope) on the spectrum of the Sun at different altitudes, of the Moon at different ages, and of *Jupiter*, and of one or two of the fixed stars; also of some of the solar prominences.

I made several successful, and I believe pretty accurate maps of the Sun's spots between the 11th and 22nd, one of which (B) shows fairly, and another (A) well, patches of faculæ. The four most successful maps were taken on the 13th, 18th, 21st, and 22nd, the last corrected up to the time of occultation of the spots by the Moon. These four accompany this Report, the others being less reliable, owing to unfavourable atmospheric influences, &c., I have thought unnecessary to preserve. The maps were made by the assistance of the 6-inch equatoreal, with powers of 31 and 65.

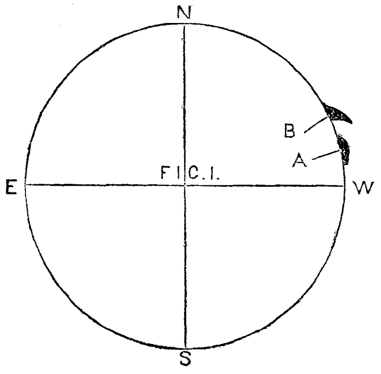

FIG. I.

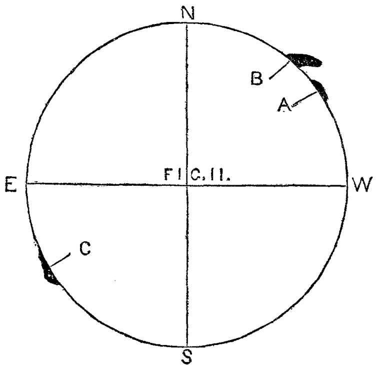

FIG. II.

I had several opportunities of examining the prominences projecting from the edge of the disk of the Sun, but the most favourable occurred on the 20th and 21st instant. On the 20th I detected two prominences nearly joining, situated at A and B, Fig. 1, of which B was the largest and manifested a disturbed condition, it gave lines C; another (C′) rather more refrangible than C; one near D and F.

On the 21st I noticed B again, the action being more violent, and by examining it in different positions of the slit of the spectroscope I believe it to be tongue-shaped, as shown in Fig. 2, and estimated its height about 30,000 miles; it then gave lines as before, to which were added another near D and one less refrangible than F; they were of varied heights and continually altering in intensity.

The prominence A was smaller than the day before, but another prominence (C) was observed on the opposite limb of the

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Sun more extensive, but not so high, giving line C (near), D (near), and F of different heights.

On the morning of the 22nd of December, the day of the total eclipse of the Sun, I carefully noted as usual the barometric, thermometric, wind, and weather readings at 9 A.M., which were

Barometer, 29·78, and falling.
Thermometer (in shade), 55° F.
Wind, W.; Force, $2\frac{1}{2}$–3.
Weather, cloudy and overcast.

At $20^h\ 24^m$ (Greenwich time) the Sun shone out for a few minutes, the wind lightened and came round a little towards south, and we were cheered with the anticipation of a fair day. There arrived at this time Mr. Reade, Consul-General of Cadiz, Mr. Campbell, Consul of Puerto St. Maria, and Señor Giuseppe Brogi, who undertook to assist me in the spectroscopic and any time general observations I might require. These gentlemen were furnished with the necessary forms to fill up and instructions for observations, time-records, &c.

My first work, as the appearance of the Sun gave me opportunity, was carefully to map the spots, which were corrected up to the time of the the principal ones being occulted by the Moon. About a quarter of an hour before first contact a considerable change for the better was manifest in the weather, the patches of blue sky becoming larger and remaining longer free from clouds, though even then a faint haze was blowing across the Sun from time to time.

I carefully watched for first contact, which I noticed took place (Greenwich mean time) at $22^h\ 50^m\ 3^s{\cdot}50$ (Mr. Campbell taking time). From this time a more decided improvement in the state of the sky took place, and all my party were enabled to observe the Sun from time to time through my telescope.

At first contact I did not observe anything like spots of light on the Moon's limb or rugged semi-illuminated projections: it had the appearance of a circular disk with a smooth edge; the darkness of the Moon was equal to that of the surrounding sky; I could then notice no difference. Some time after, however, the jagged outline of the Moon was marked on the Sun. At the occultation of the spots the Moon appeared darker than any portion of the spots, which were then very clearly seen. After this occultation I fitted and adjusted my spectroscope, and carefully recorded the position of the solar lines C, D, E, b, F, G, h, both above and below the spaces left for corona and prominence observations by means of my automatic recording arrangement.

About ten minutes before totality Señor Brogi placed the cross-wires of my finder in the eastern limb of the Sun, and followed its motion, while I searched in vain for prominences which appeared so brightly shortly after; this was probably due to the haze which

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more or less obscured the Sun at that time. This haze, however, blew over during the last ten seconds before totality, and the thin crescent of the Sun on my cross-wires enabled me to adjust my slit accurately at the last moment; the exceeding rapid disappearance of this luminous crescent in my spectrum (which disappeared from a decided measurable breadth), which now appeared almost dark, manifested to me that the long-expected moment had arrived; to my call time Mr. Campbell promptly replied, $0^{h}\ 14^{m}\ 52^{s}{\cdot}50$ (Greenwich time). I immediately directed my assistant to place the cross-wires of the finder on a portion of the corona about 8′ or 9′ from the obscured disk of the Sun, when I at once got a *continuous spectrum* about equal in intensity to that given by the Moon just before entering its third quarter, free from any lines bright or dark. I then tried to shut off the light *partially* by decreasing my aperture, my spectrum faded, still I got no lines. I opened it more than before, no appreciable alteration in the colour or brightness of my spectrum, but still no lines. I then worked with the slit at its original aperture, and directed my assistant to take some other places on the corona between 4½′ and 25′ (about the top of the corona) from the Sun's disk (which positions are marked in the sketch as black dots), the same result, a continuous spectrum free from lines. I searched in vain for the line 1474, and others whose positions I had before carefully determined; and, thanks to the kindness of Professor Young, I had particularly noted the celebrated American line in his high dispersive spectroscope a few days before at Xerez. My spectroscope gave no indication of any bright lines on that luminous portion that I believe to be the true corona, and which formed an irregular curve round the bright portion surrounding the chromosphere (as seen by sketch). This might be due to the fact of there being none to notice, or that the unfavourable atmospheric conditions did not enable me to detect any with my comparative low dispersive instrument. The parts of the corona I examined were from 4½′ to 25′ from the Moon's disk, the actual position being about 4½′, 7′, 12′, 20′, and 25′ from the Moon. I carefully avoided thus any chance of error in mixing up an achromatic chromosphere or prominences in my examination of the Corona.

During totality I wished to see if my assistant at the finder was following my directions, and so requesting him to stand on one side for a few seconds went myself to the finder, and saw the cross-wires on the part of the corona I wished to examine. For some ten or fifteen seconds I gazed at the dark orb surrounded by its glorious corona; and then I was struck by three prominences which appeared to me the largest of several on the disk, A, B, C, of which B was tongue-shaped. I then remembered my instructions to some of our party using telescopes and observing with the eye alone, for they were on the exact positions, and B also of the exact form I had predicted, from having noticed them in the spectroscope the day before. I was determined at once to

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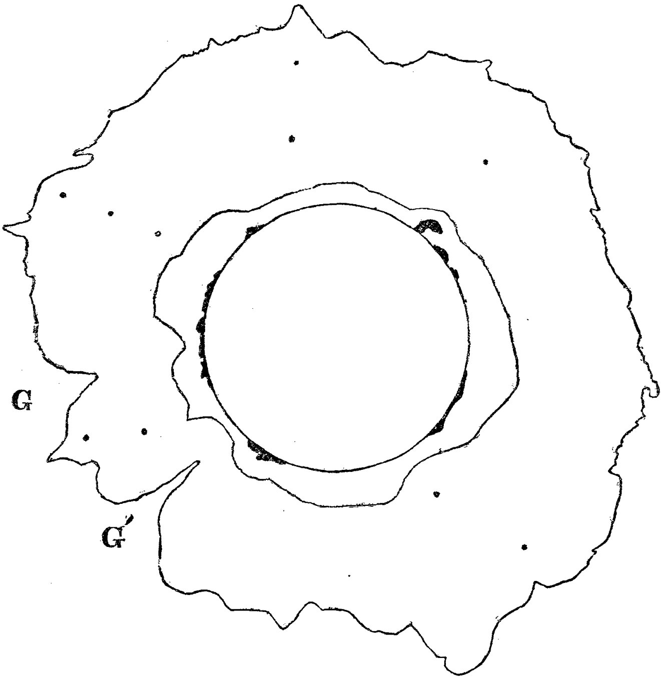
test their constitution, to see if they would give the same lines as I had before observed without an eclipse.

I have endeavoured to make a rough sketch of the picture* presented to me in the telescope and by the eye; one remarkable part of which was the difference I noticed the corona to have near the Sun, it seemed to me distinct from the rest of the corona, and to be irregular in outline, bulging out or extending much further from the Sun in some places, whereas in others it took the form of concentricity with the Sun; it had, moreover, the colour and appearance of pearl, with a bright phosphorescent tone about it, and was similar and dense throughout, whereas the rest of the corona had a faint violet colour, tinged in places with faint green and faint yellowish red, and decreasing in luminosity as its distance from the Sun increased; moreover it was jagged somewhat in outline and had gaps in it (as seen in sketch), and very faint striations might be seen in it; the inner portion, as I have said, was quite different; and I should consider it an achromatic chromosphere surrounding the regular chromosphere, and separating it from the corona. I would venture to suggest the name of Leucosphere for it, in contra-distinction both to Chromosphere and corona. I consider it to partake more of the character of the former, the latter (Corona) I believe to be solar, while the variations in colour and faint streamers may be partially due to the passage of light from less luminous portions through our atmosphere.



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* The woodcut is merely an outline from a finished coloured drawing of the Corona sent by Lieut. Brown.—*Ed.*

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To return, however, to the prominences, many of which were bright red (and could easily be seen by the naked eye), while others were pink and several more or less tinged with violet at the upper edges. (I have endeavoured to sketch them in my drawing which in rough outline was made immediately after totality.)

I directed my cross-wires to be placed on the prominence B, and immediately got the line as follows :—

	Name of Line.	Prominence B. Angular Value.	Tongue-shaped. Reduced to Kirchhoff Scale.
	C	109° 38′	695
(more refrangible than C)	C′	109 41	730
near	D	110 $4\frac{1}{2}$	1015
(less refrangible than E)	E	110 43	1470
	b	110 $56\frac{1}{4}$	1635
	F	111 $33\frac{1}{3}$	2080
	h	113 $20\frac{3}{4}$	3370

The heights of these lines were different, and violent action was manifested, especially in the lines C, F, *h* ;' the heights I was unable to measure, but have entered as carefully as I could judge with the eye; the greatest height of the prominence seemed to be $2\frac{1}{4}'$, it was bent, and near top was less red in colour, tinged with bluish violet ; its estimated height was 55,000 miles.

The prominence A gave six lines ; the positions were not recorded, but I believe them to be at C, two nearer D, one near E (which seemed to be in a position midway between the E mentioned above and the true E), one either a little less refrangible than C or identical with it ; these lines were all shorter than those in B, one near E being the highest ; they underwent less change. I did not have time to mark on my recorder their position, being anxious to pass on to the examination of C on my scale.

Prominence C.

	Name of Line.		Angles.	Reduced to Kirchhoff Scale.
	C		109° 38′	695
(near)	D		110 $4\frac{1}{3}$	1015
(near)	E	less refrangible	110 $43\frac{1}{4}$	1475
	F		111 $33\frac{1}{3}$	2080
(near)	G	(probably G)	112 $37\frac{1}{2}$	2850

The lines C, E and G were the highest, E being the highest of the three ; then came G as a broken flickering line, part being seen bright near top and at bottom with variable brightness in

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the intermediate part. There seemed to be a short line near *b*, and another short one more refrangible than G, which I could not mark as the dark disk of the Moon seemed to be rapidly covering the prominence. I devoted the rest of the time to a further examination of the corona with the same result as before. I also directed my cross-wires to be placed on the gap (marked G in figure), and then the spectrum gave no lines, but almost entirely faded away, even upon further opening the slit; the green and blue portions seemed to be comparatively brighter with respect to the red end than before.

As totality was nearly ended I directed Señor Brogi to take up a position on the advancing limb of the obscured Sun, when, after watching for three or four seconds, a thin crescent of light illuminated my spectrum, growing suddenly broad and bright, and showing the dark solar lines distinctly, giving me conclusive proof that totality was ended. I at once called time and was given $0^h\ 17^m\ 0^s{\cdot}50$, making the length of our observed totality just $2^m\ 8^s$.

With respect to the measurement of the lines in the prominences, I have endeavoured as accurately as possible to get the angular value, and from my marker believe I am correct to half a minute, but at any rate I cannot be ten divisions out on any line, taking the position of C on Kirchhoff's scale to be 695.

I will close this Report by adding the few remarks made by my assistants and handed to me.

Mr. Reade states, "At 12 minutes after noon darkness especially came on. Everything terrestrial had a leaden hue, while clouds assumed a purple colour; grass, however, was beautifully green. I saw a star or planet near the Sun (probably *Venus*)."

Mr. Campbell writes, "A cloudy day; as totality approached darkness rapidly came on. I had no need of the lamps for recording time and general observations by. I looked for a dark shadow to approach at time of totality, according to your directions, but saw none."

Senor Brogi says, "At the moment of totality, the Sun and Moon seemed to run together like one wheel running inside another in opposite directions; then immediately the corona appeared, and did not appear to fade away till after totality was ended; there was a haze blowing over the Sun part of the time."

I should add, amongst my own remarks, that, at $22^h\ 46^m$ G.M.T. a strong squall, with rain, lasting some five minutes, came on, and during totality the wind was measuring in force about 4; that darkness came on about ten minutes before totality, and the grass began to appear greener; that, during all this period, and indeed till totality, the sky and Moon appeared to me of equal darkness, but during totality the disk of the Moon was darker than the sky considerably. This might have been

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the effect partly of contrast, surrounded as the Moon was by the Leucosphere, and the corona encircling that. The edge of the corona most distant from the Moon seemed to fade in most places almost insensibly away, except where clouds gave it a more abrupt edge. They seemed to cut off some light at the edges. Doubtless, darkness during totality was less by reason of the diffused light scattered by the clouds. The amount of illumination was about equal to that given by the full Moon when a faint haze is blowing over, but of a different character.

We required no lamps for recording or reading by. The light was sufficient without. Some of the highest clouds at some 3° or more apparently from the Moon, seemed to be more illuminated by the light of the corona, Leucosphere, and prominences than those in other places.

At the moment of totality a feeling of loneliness and sadness seemed to come over one, and I could distinctly hear the subdued murmur of voices close at hand while the reappearance of the Sun seemed to bring a feeling of relief.

A few moments after totality was ended clouds blew over and the sky looked threatening. The Sun appeared for a few seconds only about a quarter of an hour after, and then disappeared for the rest of the day; heavy clouds blew up, and the wind rose, blowing at times gusts of 10 from the W.S.W. direction, with heavy rain. All this time, and in fact during the day, the barometer was falling: it read at A.M. 29·78, at 3 P.M. 29·61, and at 5 P.M. 29·55, still falling. Every effort to obtain last contact failed, and at 4 P.M. our flag, the British Ensign of the Blue, which had marked the Maria Luisa Observatory in the distance from the surrounding abodes, fell with its shattered staff. The elements seemed to say, We have up to the present held ourselves in check for your pleasure and for the success of your observations, and now that these are satisfactorily accomplished, we will have full play for our bottled-up energies.

Mr. Becker as to the Polarimeter observations reports as follows:—

The Polarimeter consisted of a Nicol prism in connection with a Savarts' band prism, attached to a box containing four glass slides, which can be turned so as to form different angles to the prisms.

The sky being covered nearly the whole morning, the preliminary observations of taking the sky polarization at certain intervals could not be taken, although the progress of observation could be well followed. As the time of totality approached, the sky brightened sufficiently in the neighbourhood of the Sun to see the totality with sufficient clearness. When totality was nearly complete, and directly after it was over, the polarimeter was directed towards the Sun, and not a trace of polarization was visible. At the time of totality the polarization appeared, the middle band being white, and was too intense to be thrown out

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by turning the plates. By inclining the instrument to an angle of 23° to the west the bands disappeared. No difference could be observed between the Moon's disk and the corona. The polarimeter not being of a construction to localise a beam of light sufficiently.

General Remarks.

Protuberances were observed in three different places more in a cloudy form, as in the shape of horns at great prominences. Just before totality the whole sky had a leaden appearance. At the time of totality the blue patches in the sky appeared of a very deep purple colour, contrasting much with the rich brown appearance of the clouds.

The northern end of the crescent appeared like a string of pearls just before it was covered by the Moon.

On the Solar Eclipse of December 22, 1870, observed at Xerez in Spain. By R. Abbay, Esq.

The instrument with which my observations of the eclipse were made was a chemical spectroscope of two prisms of 45° each, kindly lent to me by Prof. C. A. Young, of Dartmouth, U.S. The diameters of the lenses of the collimator and telescope were $2\frac{1}{4}$-inches each, and the focal lengths about 17 inches. The slit was about $\frac{1}{8}$-inch in length (nearly one-half of it being covered by the prism used for reflecting the light from the vacuum tube into the collimator) and was placed in a horizontal position. There was a horizontal and vertical motion of the whole instrument, so that the collimator could be kept on the Sun without difficulty for almost any length of time. The angle of aperture of the collimator was about 7°, so that when directed to the Sun the light passing through the prisms was composed of that proceeding from all points within an angular radius of $3\frac{1}{2}$° from the Sun's centre, including, therefore, prominences, corona, and a portion of the sky surrounding them. A short time before totality began, I arranged the slit so that the D lines just appeared as a single thick line, this being the narrowest slit which it seemed safe to attempt to use, though I had determined to narrow the slit considerably if the bright lines appeared as bands on a continuous spectrum.

At 11.44, Xerez time, I noticed the B line extremely black. As totality approached the dark Fraunhofer lines slowly disappeared, leaving a dull spectrum, which also faded away immediately before three bright lines C D F (identified by means of the vacuum tube) made their appearance. These three lines came into view within two or three seconds after the shout announced that totality had begun, and they remained about 8 or 10 seconds.